

Factor the following

and state the zeros

a) $y = x^2 - 2x - 15$

b) $y = x^2 + 8x + 12$

c) $y = -3x^2 + 33x - 30$

Nov 4-7:27 AM

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Nov 4-7:27 AM

4.4 Complex Trinomials **Trinomial $a \neq 1$**

If you cannot remove a common factor from the trinomial and the a value is not 1, and it is not a perfect square, you must use the Decomposition method or the Guess and Check method to factor the trinomial.

*** It is important to note that you will never be asked to use a specific method to factor. Choose the one you are most comfortable with.

Method 1: Guess and Check (T-method)

- Write 2 possible factors of the first term on the left side of the above.
- Write 2 possible factors of the third term on the right side of the above.
- Cross multiply and ADD to see if they add to the middle term. If not repeat with another combination of factors or switch existing factors.

Example: Factor $4x^2 - 16x + 15$

Try: Factor $3x^2 - 11x - 4$ Try: Factor $4x^2 - 14x + 6$

Jan 30-9:44 PM

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Decomposition

$$y = 4x^2 - 16x + 15$$

$$y = 4x^2 - 6x - 10x + 15$$

$$y = 2x(2x - 3) - 5(2x - 3)$$

$$y = (2x - 3)(2x - 5)$$

AC Method

$$y = 4x^2 - 16x + 15$$

$$y = 4x^2 - 6x - 10x + 15$$

$$y = 2x(2x - 3) - 5(2x - 3)$$

$$y = (2x - 3)(2x - 5)$$

Nov 4-10:05 AM

Try: Factor $4x^2 - 14x + 6$

$$y = 4x^2 - 14x + 6$$

$$y = 2(2x^2 - 7x + 3)$$

$$y = 2(2x^2 - 6x - 1x + 3)$$

$$y = 2[2x(x - 3) - 1(x - 3)]$$

$$y = 2(x - 3)(2x - 1)$$

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Method 2: Decomposition

1. Remove any common factors.
2. Find two numbers N_1, N_2 that multiply to $a \cdot c$ (call the product, M) and add to b (call the sum, A).
3. Rewrite the middle term of the trinomial as the sum of these two numbers - include the variable.
4. Group the first two terms and the last two terms using brackets. You will have to change the sign of the last term if the 3rd term is negative.
5. The binomial inside the brackets should be the same for both sets of brackets.
6. Factor. One of your factors will be the common binomial inside the brackets. The other will be a binomial made from the common factors outside the brackets.

Example: Factor $6x^2 + x - 12$

Notice there are no common factors and the first term is not a perfect square so we must use decomposition or guess and check to factor.

$M: -72$
 $A: +1$
 $N_1: -9$
 $N_2: +12$

$6x^2 + x - 12$
 $6x^2 + 9x - 8x - 12$
 $3x(2x+3) - 4(2x+3)$
 $(2x+3)(3x-4)$

$A \mid M$
 $+1 \mid -72$
 $\swarrow \searrow$
 $1 \quad 72$
 $2 \quad 36$
 $3 \quad 24$
 $4 \quad 18$
 $6 \quad 12$
 $-9 \quad +5$

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Method 2: Decomposition Shortcut

To use this method you must factor out all common factors first.

1. Find M
2. Find A
3. Find N_1 and N_2
4. Write the fractions $\frac{aX}{N_1}$ and $\frac{aX}{N_2}$
5. Reduce the fractions.
6. From top to bottom rewrite the fractions as the product of 2 binomials.

Example: Factor $3x^2 + 5x - 12$

Try: Factor

a) $8g^2 + 6g - 9$ b) $6k^2 + 2k - 4$

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Homework

Pg. 223 # 5-7, 9, 10* & 13

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5a) $2x^2 + x - 6$ $A \mid M$
 $2x^2 + 4x - 3x - 6$ $+1 \mid -12$
 $2x(x+2) - 3(x+2)$ $\swarrow \searrow$
 $(x+2)(2x-3)$ $1 \quad 12$
 $2 \quad 6$
 $-3 \quad -4$

5b) $3n^2 - 11n - 4$ $A \mid M$
 $3n^2 + 4n - 12n - 4$ $-11 \mid -12$
 $n(3n+1) - 4(3n+1)$ $+1 \mid -12$
 $(3n+1)(n-4)$ $2 \quad 6$
 $3 \quad -4$

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c) $10a^2 + 3a - 1$ $A \mid M$
 $10a^2 + 5a - 2a - 1$ $+3 \mid -10$
 $5a(2a+1) - 1(2a+1)$ $\swarrow \searrow$
 $(2a+1)(5a-1)$ $-2 \quad 5$

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Complex Trinomials Worksheet

NAME: _____

Factoring Quadratic Expressions

DATE: _____

Show all work neatly. Clearly identify the final answer.

Factor each of the following completely (Remember to look for greatest common factor):

1. $2x^2 + 3x + 1$	2. $3y^2 - 23y + 7$	3. $4x^2 - 5x - 6$
4. $4x^2 - 20x + 25$	5. $12x^2 + 32x + 21$	6. $14d^2 - 3d - 9$
7. $25y^2 + 5y - 2$	8. $24x^2 - 38x + 15$	9. $2a^2 + a - 6$
10. $4c^2 - 16c + 15$	11. $6m^2 - 11m - 10$	12. $10x^2 + xy - 3y^2$

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MPM2D

Lesson 3 - Worksheet

Factor each of the following completely (Remember to look for greatest common factor):

13. $x^2 + 8x + 16$	14. $3x^2 + 7x + 2$	15. $9m^2 + 62m - 7$
16. $x^2 - 2x - 24$	17. $x^2 - x - 30$	18. $3y^2 + 9y - 30$
19. $10x(x-1) + 3(x-1)$	20. $2x^2 + 4x - 6$	21. $4a^2 + 12a - 16$
22. $9x^2 - 25c - 30$	23. $x^2 - 7xy + 12y^2$	24. $6y^2 + 11xy + 4$

$(x+4)(x+4)$

$x^2 - 3xy - 4y^2 + 12y^2$
 $x(x-3y) - 4y(x-3y) = (x-3y)(x-4y)$

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MPM2D

Lesson 3 - Worksheet

25. $4x^2 - 20x + 25$	26. $y^2 - 8y - 48$	27. $-2x^2 - x + 15$
28. $6a(3a+1) - 2(3a+1)$	29. $4a^2 - 12a + 9$	30. $3b^2 + 24ab + 45a^2$

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